# Mid-Term Planning: NewDISS Strategy for Evolution of ESE Data and Information Systems and Services

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# Mid-Term Planning

- **ESE NewDISS Team chartered by AA in August 1998 to produce plan for an ESE "New DISS", documenting how ESE can best make available a data and information system in a timely manner during the first decade of 2000.**

- **Team draws on EOSDIS and other ESE "Lessons Learned", new technology development and infusion paradigm, new ESE mission model paradigm, and Earth Science Information Partner Federation prototype research.**

- **Planning analogy can be made to changing ESE Mission Model, where "Second Series" follow-on to EOS missions look to science questions for prioritization and best current implementation strategy.**

# Mid-Term Planning: NewDISS

**Background**

- **New DISS Team formed: Letters sent to team by AA August 28, 1998.**
- **NewDISS Plan Charter: Provide recommendations on how to proceed beyond 2000 and throughout the next 5 to 7 to 10 years. While acknowledging the present need in information technology to create distributed and flexible, responsive systems and ESE's need to have smaller, more manageable pieces, there is at some level necessary a framework to integrate our activities. The Long-Term Plan should be recommended after advice and debate with all relevant stakeholders, and with knowledgeable experts within and without our Enterprise and Agency at large.**
- **Focus was on Science Information System element (interface is to SOMO for mission ops).**
- **Although primarily driven by science goals of the Enterprise, flexibility and capability to provide support to other elements (such as Applications) seen as requisite.**
- **The NewDISS Plan will be shared with the ESSAAC and the relevant NRC/NAS bodies prior to implementation.**

***Formulation of this plan can be seen as a development parallel to and taking into account the New Mission Model and Second Series formulation.***

# NewDISS Team Members

**Members**

Martha Maiden, Chair
Vanessa Griffin
Matt Schwaller
Candace Carlisle
Ron Weaver (DAAC Manager)
Roy Jenne (DISS Expert/ERG)
Karen White
Sara Graves (ERG Chair)
Dave Skole (Federation)
Anngie Johnson
Guenter Riegler (Code S DISS POC)
Tom Lasinski (ARC (now LLNL)
John Townshend (IT and Federation)

**Consultants**

Mark Abbott (NRC/IDS/SEC/IWG)
Ricky Rood (EOS IDS)
Dave Glover (EOS IDS)
Dolly Perkins (ESDIS Proj Mgr)
Mike King (EOS Proj Scientist)
Skip Reber (EOS Dep Proj Scientist)
Chris Scolese (EOS)
Steve Smith/Karen Moe (ESTO)
Moshe Pniel (IT, Data Panel)
Tom Karl (NRC/LTA)
Pamela Matson (Biennial Review)
Jim Frew (Federation)
Dave Emmitt (Data Panel Chair)
Tony Janetos

# NewDISS Document: ESE DIS "Lessons Learned"

- **Information technology outpaces the time required to build large, operational data systems and services.**
- **Data systems and services should leverage off emerging information technology; and not try to drive it.**
- **A single data system should not attempt to be all things to all users.**
- **A single, large design and development effort stifles creativity.**
- **Future information systems will be distributed and heterogeneous in nature.**

***These same "Lessons Learned" are employed by ESE Vision team.***

# NewDISS Document: Principles

- **Future requirements will be driven by a high data volume, and increasing demand for a variety of data products by a diverse user base.**
- **Science questions and priorities must determine the design and function of systems and services.**
- **Technological change will occur rapidly: systems and services, and the enabling networks, must be able to take advantage of these changes.**
- **Competition is a key NASA tool for selection of NewDISS components and infrastructure.**
- **Long term stewardship and archiving must occur.**
- **PI-processing and PI-led data management will be a significant part of future missions and science.**

# NewDISS Concept

- **Lessons Learned and Principles lead logically to a set of NewDISS components, based on a dynamic network of interconnected elements.**
- **Evolution means 'start where you are': nearterm NewDISS leverages the structure of existing systems and services.**
- **Approach defined is more distributed and heterogeneous, compared to the current EOSDIS cum EOSDIS Core System presently being implemented.**
- **NewDISS seeking Goldilocks's "just right" approach to data and information systems and services suited to ESE needs and IT culture.**

# NewDISS Proposed Components

- **Backbone Data Centers: data preservation and stewardship**
  - **Establish by review of charters of present DAACs**
  - **Provides data preservation and interfaces to Long-Term Archive - present LTA considerations focus on "Basic Data", nominally level 1 data, which can be reprocessed for long-term climate products**
  - **Review and/or competition on ~5-7 year timescale**
- **Mission Data Systems: funded and managed by missions**
  - **Establish by HQ mission competition, must ensure Science Information System component adequately reviewed**
  - **Established for life of mission, and must ensure data availability beyond mission**
- **Science/Multi-Mission Data Centers : focused objectives**
  - **Establish by HQ competition**
  - **ESIP 2 lessons learned points to 5-year competitions instead of the 3-year timeframe**

***These roles are not necessarily exclusive. For example, Backbone Data Centers may also partner with mission proposers or compete for Science Data Center roles.***

# "Standards and Practices" Enable NewDISS

## New DISS Defines "Standards and Practices"

- Published, open "Standards and Practices" kept by NewDISS management, complied by NewDISS participants, included in Research Announcements for Mission Data Systems, Science Data Centers
- Where no simple standards exist, must arbitrate extent of conformity and when changes made
- Utilize federation-style participation for airing "Standards and Practices" evolution

## New DISS Focus on Interface Standards

What are interfaces? Interfaces are how you specify a system of cooperating autonomous components.

- Formal descriptions of
  - Behavior of
  - Relationships between (e.g. client <->server)
- Act as
  - Boundaries separating
  - Contracts ("treaties") between
- Enable and constrain inter-component communication
  - Protocols

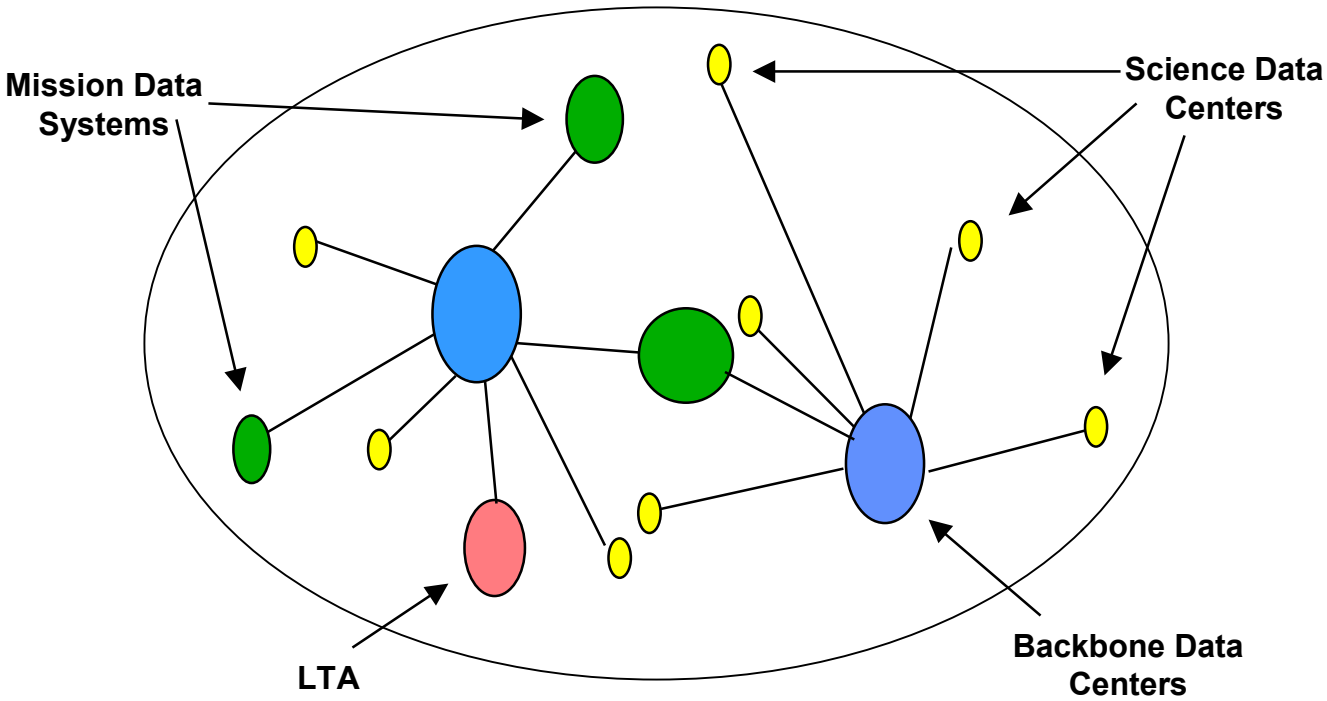
# NewDISS Document: Recommendations

- **Support a spectrum of heterogeneous participants and approaches to NewDISS.**
- **Support a spectrum of heterogeneous technological approaches to NewDISS.**
- **Clearly define the components of NewDISS, and ensure suitable management of the interfaces between them.**
- **Employ a NewDISS infrastructure that includes active liaison with service providers both within NASA and within the private sector for procurement of common operations activities.**
- **Employ competition and peer-review in the process used for choosing NewDISS components.**
- **Empower science investigators with an appropriate degree of responsibility and authority for NewDISS data system development, processing, archive and distribution.**
- **Use lessons learned from the current, experimental ESE federation as a step towards the NewDISS, and proceed with the Federation Experiment with this evolution in mind.**
- **Charter, without delay, a transition team with the objective of developing a transition plan, based on the findings and recommendations of this document, that would lead to the initiation of a NewDISS starting in the year 2000.**

# NewDISS Keys for Success

- **Competition is overriding principle for product creation.**
- **Published, open interface standards are needed to create a level playing field.**
- **NASA must provide leadership to identify requirements, set priorities, and link requirements to cost and functionality. Leadership must be capable of organizational and interorganizational change.**
- **Management of NewDISS will be fundamentally different and a more abstract function than provided by NASA currently, concentrating on managing key standard interfaces and integrating suitable data service capabilities. This represents a cultural shift for NASA.**
- **Metrics and incorporation of feedbacks into design and performance key to maintaining excellence.**

# NewDISS: A Dynamic Network



# NewDISS Vision

- **NewDISS Open Interfaces**
  - **Concept refinements made, defining core and community standards and practices, especially emphasizing again the NewDISS concept of open and published interfaces.**
  - **Open GIS presentations and discussions generated a lot of interest as a model to be mined for applicability to NewDISS.**
  - **Adherance to interface standards allows "ecosystem" concept of data systems and services, i.e. allows for number and size of nodes to change - maintaining flexibility in evolution to support changing ESE needs.**
- **NewDISS Partnerships**
  - **NewDISS Principles will be Partners, and with partnership comes responsibility**
  - **Ease of use emphasized for all participants, end users**
- **Concept for DISS supports ESE Goals**
  - **NewDISS Report provides high-level vision of working, evolving DISS comprised of heterogeneous, distributed nodes.**

# NewDISS Challenges

## Management needs of NewDISS from articulated design:

» **For NewDISS nodes**

- **Adherence to core interfaces, and to standards and practices**
- **Provision of metrics**
- **Financial/Accounting Practices**
- **Reviews/Evaluations**
- **Deliverables**

» **For NewDISS**

- **Facilitation of partnerships: interagency, USGCRP, international, private sector, for information technology and networking**
- **Data policy, copyright, liability issues**
- **Integrity and preservation of observations**

» **Establishment of successful leadership and governance model**

- **NewDISS Report calls for shared governance in key areas, such as standards and technology infusion**
- **Must be able to respond appropriately to background IT volatility, complexity of task, changes in scientific priorities**

# HQ Progress on NewDISS

**NewDISS Recommendation #3:**

- **Clearly define the components of NewDISS, and ensure suitable management of the interfaces between them.**

**NASA Headquarters has interpreted the NewDISS Mission Data Centers and MultiMission Data Centers descriptions in light of the ESE Research Strategy. We are moving to evolve to a concept of Measurement Data Systems. For example, NewDISS-informed formulation of the Global Precipitation Mission has led to a NewDISS Prototype Precipitation Data System, which evolves from the TRMM Data and Information System and will include the GPM measurements.**

- ✓ **Use of term "Systems" instead of "Centers" implies a science processing function that may not be a stand-alone center.**

**NASA Headquarters will be issuing a Cooperative Agreement Notice in the very near future for NewDISS Science Data Center functions.**

# HQ Agreement with NewDISS Concept

**References to interfaces as key to the success of a more heterogeneous and distributed data system:**

**From NewDISS C.3 An Implementation Scenario (p. 28)**

"What matters is that the community agrees on a "common face" for its participation in ESE NewDISS, and that other elements of NewDISS are able to accommodate these standards and practices when necessary."

**From NewDSS D. NewDISS Interfaces, Standards, and Practices (pp.28-29)**

**"**At present, the relationship-building between data centers and domain brokers is not explicit. NewDISS makes this relationship explicit, through the setting of core rules and standards, described below, including various core rules of engagement. This does not, however, imply that NASA needs to fund or support all necessary domain brokers, although it may be prudent to establish some critical ones for specific areas of science priority or emphasis."

**HQ understanding of the NewDISS objective is for common, published, functional interfaces that do not need a human in the loop.**